

WHAT IS CLAIMED IS:

1. A ball screw apparatus comprising:

a screw shaft including a spiral-shaped screw groove
5 formed in an outer peripheral surface thereof;

a nut movably fitted with the screw shaft and including
a screw groove formed in an inner peripheral surface thereof
so as to correspond to the screw groove of the screw shaft;

a large number of balls rollably disposed in a loaded
10 raceway formed between the two screw grooves; and

a side cap mounted on the outer peripheral portion of
the nut and including a ball circulation passage for scooping
up the balls rolling along the loaded raceway in a direction
coincident with the lead angle of the two screw grooves and
15 returning the balls to the loaded raceway,

wherein, the two screw grooves are respectively formed
as multiple thread screws and the side cap is disposed on each
of the multiple threads.

20 2. A ball screw apparatus comprising:

a screw shaft including a spiral-shaped screw groove
formed in an outer peripheral surface thereof;

a nut movably fitted with the screw shaft and including
a screw groove formed in an inner peripheral surface thereof
25 so as to correspond to the screw groove of the screw shaft;

a large number of balls rollably disposed in a loaded raceway formed between the two screw grooves; and,

a side cap mounted on the outer peripheral portion of the nut and including a ball circulation passage for scooping
5 up the balls rolling along the loaded raceway in a direction coincident with the lead angle of the two screw grooves and returning the balls to the loaded raceway,

wherein the nut includes a plurality of ball circulation circuits each formed by the loaded raceway and the ball
10 circulation passage.

3. A ball screw apparatus as set forth in Claim 2, wherein the circulation movements of the balls in the plurality of ball circulation circuits are carried out by a single side cap.
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4. A ball screw apparatus as set forth in Claim 2, wherein the circulation movements of the balls in the plurality of ball circulation circuits are carried out by the side caps respectively disposed on associated ball circulation circuits.
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5. A ball screw apparatus as set forth in Claim 4, wherein a relief portion for prevention of mutual interference between the two side caps is disposed between the mutually adjoining side caps.
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6. A ball screw apparatus as set forth in Claim 2, wherein
a plurality of circulation holes are formed in the outer
peripheral portion of the nut in communication with the loaded
raceway in order to fit the side cap into the nut, and the plurality
5 of circulation holes are disposed so as to be prevented from
interfere with each other.

7. A ball screw apparatus as set forth in Claim 3, wherein
a plurality of circulation holes are formed in the outer
10 peripheral portion of the nut in communication with the loaded
raceway in order to fit the side cap into the nut, and the plurality
of circulation holes are disposed so as to be prevented from
interfere with each other.

15 8. A ball screw apparatus as set forth in Claim 4, wherein
a plurality of circulation holes are formed in the outer
peripheral portion of the nut in communication with the loaded
raceway in order to fit the side cap into the nut, and the plurality
of circulation holes are disposed so as to be prevented from
20 interfere with each other.

9. A ball screw apparatus as set forth in Claim 5, wherein
a plurality of circulation holes are formed in the outer
peripheral portion of the nut in communication with the loaded
25 raceway in order to fit the side cap into the nut, and the plurality

of circulation holes are disposed so as to be prevented from interfere with each other.

10. A ball screw apparatus as set forth in Claim 6,
5 wherein the circulation holes are disposed outwardly in the diameter direction of the nut with respect to the center axial line of the nut.

11. A ball screw apparatus as set forth in Claim 7,
10 wherein the circulation holes are disposed outwardly in the diameter direction of the nut with respect to the center axial line of the nut.

12. A ball screw apparatus as set forth in Claim 8,
15 wherein the circulation holes are disposed outwardly in the diameter direction of the nut with respect to the center axial line of the nut.

13. A ball screw apparatus as set forth in Claim 9,
20 wherein the circulation holes are disposed outwardly in the diameter direction of the nut with respect to the center axial line of the nut.

14. A ball screw apparatus comprising:
25 a screw shaft including a spiral-shaped screw groove

formed in an outer peripheral surface;

a nut movably fitted with the screw shaft and including a screw groove formed in an inner peripheral surface so as to correspond to the screw groove of the screw shaft;

5 a large number of balls rollably disposed in a loaded raceway formed between the two screw grooves,

a side cap mounted on the outer peripheral portion of the nut and including a ball circulation passage for scooping up the balls rolling along the loaded raceway in a direction
10 coincident with the lead angle of the two screw grooves and returning the balls to the loaded raceway,

wherein a plurality of the nuts are connected together in the axial direction thereof.